Name

Date Pd

Unit 1: Worksheet 2 - Reading Scales

For each of the following, write the scale reading, then the number of significant figures in the reading.

**Reading SF’s**

1. 

2. 

3. 

4. 

5. 

6. 

7. 

8. 

For each of the volume devices below record the scale reading and indicate the uncertainty in the measurement (± ).





Name

Date Pd

Chemistry – Unit 1 Worksheet 3

## Mass, Volume, and Density

|  |  |
| --- | --- |
| 1. Study the matter shown in Figure 1. Each dot represents a particle of matter. [*Assume the particles are uniformly distributed throughout each object, and particles of the same size have the same mass*.]   * 1. In the table below, show how the masses, volumes, and densities of A and B compare by adding the symbol **<, >, or =** to the statement in the second column.   2. Explain your reasoning for each answer in the last column. |  |

|  |  |  |
| --- | --- | --- |
| **Property** | **Relationship** | **Reasoning** |
| Mass | A \_\_\_\_ B |  |
| Volume | A \_\_\_\_ B |  |
| Density | A \_\_\_\_ B |  |

**FIGURE 2**

**A B**

**C**

2. Study the matter in Figure 2. [*Assume the particles are uniformly distributed throughout each object, and particles of the same size have the same mass*.]

a. In the table below show how the masses, volumes, and densities compare by adding the symbol **<, >, or =** to the statement in the second column.

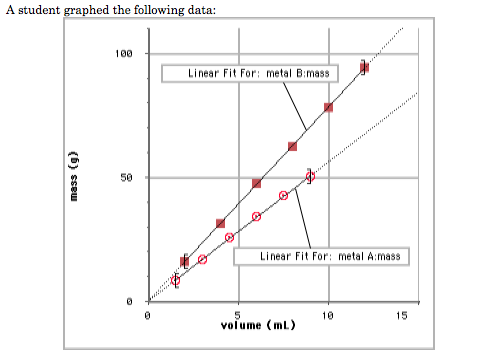
b. Explain your reasoning for each answer in the last column.

|  |  |  |
| --- | --- | --- |
| **Property** | **Relationship** | **Reasoning** |
| Mass | A \_\_\_\_ B  A \_\_\_\_ C |  |
| Volume | A \_\_\_\_ B  A \_\_\_\_ C |  |
| Density | A \_\_\_\_ B  A \_\_\_\_ C |  |

**E F**

3. Is object E or object F more dense? [*Assume the particles are uniformly distributed throughout each object, and particles with a larger size have a larger mass*.] Explain your reasoning.

Applied Density Problems#1



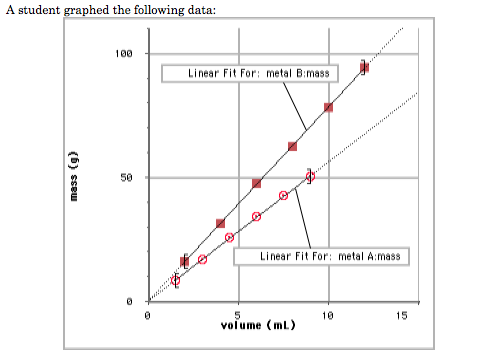
1. (4-2) Based on this graph, how does metal A differ from metal B?

2.(4-2) (3-2) What is the density of metal A? Show all your work and include appropriate units. Will it sink or float in water?

3. (4-2) (3-2) What is the mass of 10.0 cm3 of metal A? Find this in two different ways.

a. Mark on the above graph how you might determine this.

b. Show your work on how you might also calculate this mathematically.

Applied Density Problems#2

1. (4-2) Based on this graph, how does metal A differ from metal B?

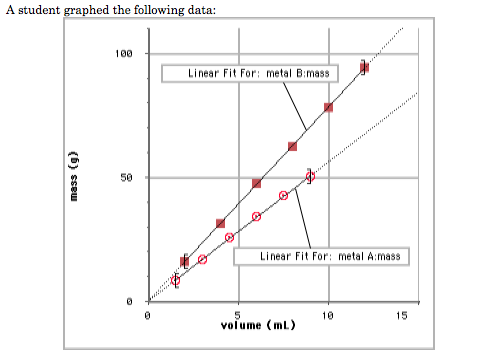
2.(4-2) (3-2) What is the density of metal B? Show all your work and include appropriate units. Will it sink or float in water?

3. (4-2) (3-2) What is the mass of 10.0 cm3 of metal B? Find this in two different ways.

a. Mark on the above graph how you might determine this.

b. Show your work on how you might also calculate this mathematically.

Applied Density Problems#3



1.(4-2) Based on this graph, how does metal B differ from metal A?

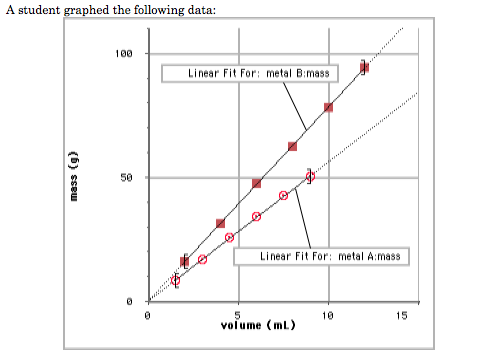
2.(4-2) (3-2) What is the density of metal B? Show all your work and include appropriate units. Will it sink or float in water?

3. (4-2) (3-2) What is the mass of 9.0 cm3 of metal B? Find this in two different ways.

a. Mark on the above graph how you might determine this.

b. Show how you could calculate this mathematically.

Applied Density Problems#4



1.(4-2) Based on this graph, how does metal B differ from metal A?

2.(4-2) (3-2) What is the density of metal A? Show all your work and include appropriate units. Will it sink or float in water?

3. (4-2) (3-2) What is the mass of 12.0 cm3 of metal A? Find this in two different ways.

a. Mark on the above graph how you might determine this.

b. Show how you could calculate this mathematically.

Metric and Dimensional Analysis

Remember King Henry died by drinking chocolate milk!

For now, our base values are grams, meters, and liters

1. 3.786 m = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_km

2. .0083 hg = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_dg

3. 50,200 cm = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ dam

4. .0045 kg = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_mg

Now we are going to convert the English system and the metric system. To do this, we will need to know three conversions. They are:

1 inch = 2.54 cm

1 qt = .946 l

1 lb = 453.6 g

Now let’s try to use dimensional analysis and one of the conversions to solve the following:

5. 2.56 ft = \_\_\_\_\_\_\_\_\_\_\_\_\_\_cm

6. 4.3 oz = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_kg

7. 560 cm = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_in

8. 1.22 lb = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_g

9. 4.3 qt = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ l

10. 300 cg = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lb

11. 3.4 gal = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_dl

12. 12 oz = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_mg

Now for a challenge:

13. 55 mi/hr = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_km/hr

14. 15 km/hr = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_mi/hr

15. 186,000 mi/s = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_m/hr

16. If you gained 2 pounds in a week, how many grams is that per day?

17. You are able to run the 50 yards in 8 seconds, how fast is that in miles per hour?

18. You need to pour 2 cubic yards ( yd3) of concrete for a patio. What is this volume in cubic meters (m3).

Density Practice

1. Determine the volume of 35.2 grams of CCl4 will occupy if it has a density of 1.60 g/ cm3 ?

2. The density of ethanol is 0.789 g/ cm3 at 20 C. What is the mass of 150 cm3 of the solution?

3. What is the density of a hydrochloric acid solution which has a mass of 17.84 grams and occupies 15.00 cm3 ?

4. What is the density of the following materials?

a. 35.0 g of a substance which occupies 25.0 cm3.

b. 2.75 g of a substance which occupies 250 cm3.

c. 2.80 kg of a substance which occupies 2.00 L.

5. The mass of 15 cm3 of a solution is 12 g. Calculate the density of the solution.

6. The density of a solution is 1.5 g/cm3. Calculate the mass in grams of 10 cm3 of the solution.

7. The density of a solution is 1.80 g/cm3. What volume will 360 g of the solution occupy?

8. A block of lead measures 20.00 mm x 3.00 cm x .45 dm. Calculate the mass of this block if the density of lead is 11.34 g/ cm3 ?

9. What is the density of a solid piece of iron which has a mass of 11.78 grams and is 30 mm long, 1 cm wide and .05 dm thick?

10. There are three identical tanks that measure 4.00 cm long, 4.00 cm wide and 30.00 mm deep.

a. The first tank is filled with water that has a density of 1.00 g/cm3. What will be the mass of this tank?

b. The second tank is filled with CCl4 that has a density of 1.58 g/cm3. What will be the mass of this tank?

c. The third tank is filled with Hg that has a density of 13.6 g/cm3. What will be the mass of this tank?

d. Which tank has the most mass? Explain.

More practice and more challenging density problems:

1. The density of a solution is 1.35 g/ cm3. Calculate the mass in grams of 10.0 cm3 of the solution.

2. The density of a solution is 1.83 g/ cm3. What volume will 330. Grams of the solution occupy?

3. You have 30.0 g of nitric acid (HNO3). If the density of nitric acid is 1.25 g/ml, how many ml of nitric acid will you need?

4. You filled a fish tank with water. The fish tank holds 10 gallons. The density of water is 1.00 g/ ml. How many **pounds** of water were used to fill the tank?

5. Which would be heavier? A ball of lead with a diameter of 2.00 cm or a cylinder of iron with a diameter of 3.00 cm and a height of 8.00 cm. ( D of lead is 11.3 g/ cm3. D of iron is 7.86 g/ cm3. V of a sphere is 4/3 π r3. V of a cylinder is π r2 h).

6. A rectangular rod of copper measured 12.00 mm x 2.00 cm x 1.00 m. If the density of copper is 8.92 g/ cm3, what is the mass in kilograms of the copper rod?

Chemistry Homework Unit 1- #1 Significant Digits and Scientific Notation

1. How many significant digits do each of the following numbers have?

a. 1.00060 \_\_\_\_\_\_\_ b. .000234 \_\_\_\_\_\_ c. .10000 \_\_\_\_\_\_\_\_\_\_

d. 100000 \_\_\_\_\_\_\_ e. 100100 \_\_\_\_\_\_\_\_ f. 1.3400 x 104 \_\_\_\_\_\_\_\_\_

2. Round off the numbers to 3 significant digits.

a. 1.234234 \_\_\_\_\_\_\_ b. 48.965\_\_\_\_\_\_\_\_\_ c. .000023000 \_\_\_\_\_\_\_\_\_\_\_\_

3. Do the following calculations and round off the answer to the correct number of significant digits.

a. (5.78)(1.00876)(.0024) = \_\_\_\_\_\_\_ d.. (20)(9876)(.000025) ÷ (8790)(53.60) = \_\_\_\_\_

b. (9.760)(10500) ÷ (4.300) = \_\_\_\_\_\_ e. (2.909) – (1.34) = \_\_\_\_\_\_\_\_\_

c. 209.3 + 34 + .0005 + 28 = \_\_\_\_\_\_\_\_\_\_ f. 3.9820 -1.88 + 2930 = \_\_\_\_\_\_\_\_\_\_

4. Do the following problems and round the answer off to the correct number of significant digits.

a. An object has a mass of 234.86g and a volume of 26.2 ml. What is the density?

b. How much would a 2.00 liter bottle weigh if it were filled with mercury? (d = 13.62 g/ml for Hg)

c. What volume would 500 grams of aluminum have if the density is 2.712 g/ml?

5. Do the following calculations: (Your answer should be in scientific notation)

a. ( 3.65 x 104 )( 8.34 x 10-5) =

b. (9.353 x 105)( 4.56 x 106) / (1.34 x 108 ) =

c. (4.67 x 10-3)( 8.356 x 109) / (1.99 x 105 )( 2.66 x 10-12) =

d. (1.24 x 108 ) – ( 5.28 x 107) =

e. (8.77 x 105 ) + (1 x 107)

6. Take the answers in problem #5 and round them to the correct number of significant figures based on the starting numbers.